

IN THE SPECIFICATION

1. Please amend paragraph [0008] as follows:

[0008] The light components L2 and L3, reflected from external ambient light have relatively higher illumination between these peaks 21 to 23 of Fig. 2, since their spectral distribution is continuous across all the visible wavelengths. The spectrum of light emitted from the blue and green phosphor has relatively broad bandwidths and thus some of wavelengths, from 450 nm to 550 nm, ~~are overlapped~~ overlap with each other. The spectrum of red phosphor has undesirable side bands around 580 nm, at which wavelength the luminous efficiency is high. Therefore, selective absorption of light in the overlapping wavelengths between blue and green phosphor at and around 450 nm to 550 nm would greatly improve color purity of a CRT without sacrificing the luminescence efficiency of phosphors.

2. Please amend the paragraphs [0011]-[0014] as follows:

[0011] In relation to the problem as described above, U.S. Patent Nos. 4,019,905 to Tomita *et al.*, 4,132,919 to Maple and 5,627,429 to Iwasaki[[,]] relate to an intermediate layer including organic or inorganic pigments or dyes with absorbability of light at predetermined wavelengths that is coated between the inner surface of the face panel and the phosphor layer. While such a technique can be advantageous with respect to the application of a manufacturing process of a CRT, the dyes and pigments used in the intermediate layer typically have a broad absorption wavelength and, thus, [[a]] the contrast of [[a]] the CRT generally does not improve significantly.

[0012] Also, U.S. Patent Nos. 5,068,568 to de Vrieze *et al.* and 5,179,318 to Maeda *et al.* disclose an intermediate layer including layers of a high refractive index and a low refractive index alternately between the inner surface of the face panel and the phosphor layer. Further, a method of forming a corresponding filter layer on [[a]] an RGB

phosphor layer is described in *SOCIETY OF INFORMATION AND DISPLAY DIGEST*, “5.1 Invited Paper: “Microfilter”™ Color CRT”, Itou *et al.*, 1995 pages 25-27. However, this method typically needs additional equipment and a modification of the manufacturing process, since coating, light exposing and developing processes for the corresponding filter layer are typically further conducted compared to a conventional technique.

[0013] Additionally, U.S. Patent No. 6,090,473 to Yoshikawa *et al.* ~~disclose~~ discloses a plasma display panel including a face panel to which a glass plate or film is adhered so as to improve contrast and shield an electron wave.

[0014] An objective of the present invention is to provide a filter layer to improve the contrast of a display by absorbing light in the overlapping wavelengths among red (R), green (G) and blue (B) phosphors.

3. Please amend paragraph [0044] as follows:

[0044] The light components L2 and L3 reflected from external ambient light have relatively higher illumination between these peaks 21 to 23 of Fig. 2 since their spectral distribution is continuous across all the visible wavelengths. The spectrum of light emitted from the blue and green phosphor has relatively broad bandwidths and thus some of wavelengths, from 450 nm to 550 nm, ~~are overlapped~~ overlap with each other. The spectrum of red phosphor has undesirable side bands around 580 nm, at which wavelength the luminous efficiency is high. Therefore, selective absorption of light in the overlapping wavelengths between blue and green phosphor at 450 nm to 550 nm and around 580 nm would greatly improve color purity of a CRT without sacrificing the luminescence efficiency of phosphors.

4. Please amend paragraphs [0046]-[0048] as follows:

[0046] A filter layer of the present invention including includes oxide particles and

nano-sized metal particulates adhered to a surface of the oxide particles. A surface plasma resonance (SPR) phenomenon is induced at the interface of the oxide/metal to selectively absorb light with predetermined wavelengths.

[0047] The metal of the nano-sized metal particulates is selected from the group consisting of a transition metal, an alkali metal, an alkali earth metal, and mixtures thereof. Examples of the metal are Au, Ag, Pd, Pt, Cu, Ni, Sb, Sn, Zn, Zr, Se, Cr, Al, Ti, Ge, Fe, W, Pb or mixtures thereof. Among them, Au, Ag, Pd, Pt or mixtures thereof [[is]] are preferable since these metals are capable of absorbing visible light.

[0048] As the oxide of the oxide particles, silica, titania, zirconia, alumina or mixtures thereof are preferably used. According to one example of the present invention, preferred combinations[[,]] are silica/titania, alumina/zirconia, and alumina/titania in a mole ratio of 0.1-2.0/8.0-9.9, respectively.

5. Please amend paragraph [0054] as follows:

[0054] In the present invention, after the metal salt, the reducing agent, and the dispersing agent are added to an organic solvent, such as alcohol, to prepare a metal colloid in a reduced state as a metal particulate precursor, the metal colloid is mixed with an oxide sol dispersed in water to prepare a coating solution, and the coating solution is applied on a face panel and dried to form a filter layer. The filter layer is prepared through [[only]] a drying process alone without a heat-treatment process, and explosion proof equipment is advantageously not required.

6. Please amend paragraph[0056]-[0058] as follows:

[0056] The filter layer applied on a face panel of a display absorbs light with overlapping wavelengths among RGB phosphors to improve contrast of the display by inducing [[a]] an SPR phenomenon at the interface of the oxide/metal. For example, the filter formed on a face panel of a CRT improves the contrast of a CRT by absorbing light

selectively with overlapping wavelengths among RGB phosphors and wavelengths around 580 nm, and by reducing reflection at an inner or an outer surface of a face panel.

[0057] The absorption intensity and the absorption peak wavelength depend on at least one factor selected from the group consisting of kinds or types, contents and size of metals, and kinds or types and contents of oxides. For example, for gold (Au), silver (Ag) and copper (Cu) particulates less than 100 nm in diameter adhered to silica, light is absorbed around the wavelengths of 530 nm, 410 nm and 580 nm, respectively. With platinum (Pt) or palladium (Pd), the light absorption spectrum is rather broad, from 380 nm to 800 nm, depending on the kind of oxide. Accordingly, a particular wavelength absorbed depends on the kind or type of oxide, i.e., its refractive index, a kind or type of metal, and a size of such metal particulates. It is known that the refractive index of silica, alumina, zirconia and titania are 1.52, 1.76, 2.2 and 2.5-2.7, respectively.

[0058] In the present invention, the metal particulates are nano-sized particulates desirably within the range of above 1 nm and less than 10 nm. However, for the present invention, "nano-sized" is defined from several nanometers to hundreds of nanometers. In other words, a "nano-sized particulate" is a particulate greater than 1 nanometer but less than 1 micrometer in diameter. Generally, as the size of metal particulates increase increases until it reaches 100 nm, its absorption intensity tends to increase. Above 100 nm, as the size increases the absorption peak moves toward long wavelengths. Accordingly, the size of the metal particulates affects both the absorption intensity and the absorption peak wavelength.

7. Please amend paragraph [0061] as follows:

[0061] For example, a filter with gold (Ag) particulates and silica particles has an absorption peak at 530 nm. This filter can be made to absorb light around 580 nm by the following methods. One method is to add a second oxide material, such as titania, alumina or zirconia, for example, having a greater refractive index than silica so that its

absorption peak moves toward a longer wavelength. An amount of the added oxide material as a second component will determine the absorption intensity. The intensity of an absorption peak should be set taking into account the transmission efficiency of a glass panel and the density of the filter. Generally, it is preferable that the shapes of the absorption peaks [[are]] be sharp and that the absorption intensity [[is]] be large. A second method is to increase the size of the metal (gold) particulates without addition of a second oxide material. When a coating solution [[where]] composed of metal colloids [[are]] dispersed in an oxide sol is applied on a surface of the glass panel, and a coating filter layer is formed through a sol-gel process, the metal particulates are coated and adhered to the surface of an oxide particle. The size of the metal particulates can be controlled by varying the kinds, or types, or amounts of a reducing agent. For instance, the more the reducing agent, or the stronger the reducing power added, the larger the particulates become larger.

8. Please amend paragraph [0064] as follows:

[0064] Preferred embodiments of the present invention will now be described in detail with reference to the accompanying drawings, particularly Figs. 3 through 20, with [[a]] the same numeral being used in the drawings denoting to denote the same element throughout the specification.

9. Please amend paragraph [0066] as follows:

[0066] Continuing with reference to Fig. 3, a phosphor screen 2 is formed on an inner surface of the display portion 11 of the face panel 10. The phosphor screen 2 includes a black matrix layer 20, made of a light-absorbing graphite compound, [[and]] a phosphor layer 30 including red (R), green (G) and blue (B) phosphor pixels, and a metal reflection layer 40 (*see* Figs. 4A-10). A mask frame 4a is attached to the lateral wall 12, and a shadow mask 4 is connected to the mask frame 4a to be suspended substantially parallel

to and at a predetermined distance from the phosphor screen 2.

10. Please amend paragraph [0076] as follows:

[0076] Fig. 8 illustrates a cross-sectional view of a CRT, such as CRT A1 of Fig. 3, according to an embodiment of the present invention, including a face panel 10 with a conductive film 51 for preventing static from being disposed on the outer surface 10b of the face panel 10 between the face panel 10 and the filter layer 50c. A protective layer or anti-reflection layer can be formed on the conductive film 51. Generally, the conductive film 51 includes indium tin oxides (ITO) and the anti-reflection layer is made of silica. According to the present invention, minute metal particles are added to a silica sol prior to forming of the silica anti-reflection layer. Thus, the anti-reflection layer advantageously serves an extra function of selective light absorption.

11. Please amend paragraph [0086] as follows:

[0086] Referring to Figs. 13 and 14, the PDP B2 includes: a rear substrate 60 including a plurality of address electrodes 70 disposed on the rear substrate 60, and a first dielectric layer 80a disposed on the rear substrate 60 and covering the address electrodes 70; spacers 100 located on the first dielectric layer 80a between the address electrodes 70 to create a discharge space or discharge spaces 100a[[,]]; phosphor layers 90 formed on the first dielectric layer 80a in the discharge space or spaces 100a; a front substrate 61 including a plurality of scan electrodes 71 and common electrodes 72 disposed on the front substrate 61 in a direction transverse to the address electrodes 70, and a second dielectric layer 80b disposed on the front substrate 61 covering the scan electrodes 71 and common electrodes 72; a filter layer 53 disposed on the second dielectric layer 80b includes nano-sized minute metal particulates adhered to a surface of oxide particles, [[and]] the filter layer 53 provides providing at least one selective absorption peak for

light at a predetermined wavelength of light by the induction of a surface plasma resonance (SPR) phenomenon at the interface between the metal particulates and the oxide particles; a third dielectric layer 80c disposed on the filter layer 53; and a protective layer 110 disposed on the third dielectric layer 80c.

12. Please amend paragraphs [0089]-[0090] as follows:

[0089] In this regard, PDP B4 of Fig. 16 is similar in components composition and structure as described above with respect to PDP B2 of Figs. 13 and 14 except for the third dielectric layer 80c, and Fig. 16 is a cross-sectional view of the PDP B4 that includes: a rear substrate 60 including a plurality of address electrodes 70 disposed on rear substrate 60 similar to PDP B2, and a first dielectric layer 80a disposed on the rear substrate 60 and covering the address electrodes 70 similar to PDP B2; [,] spacers 100 on the first dielectric layer 80a located between the address electrodes 70 to create a discharge space or discharge spaces 100a; phosphor layers 90 formed on the first dielectric layer 80a in the discharge space or spaces 100a; a front substrate 61 including a plurality of scan electrodes 71 and common electrodes 72 disposed on the front substrate 61 in a direction transverse to the address electrodes 70 similar to PDP B2, and a second dielectric layer 80b disposed on the front substrate 61 covering the scan electrodes 71 and common electrodes 72; a filter layer 54 disposed on the second dielectric layer 80b including nano-sized minute metal particulates adhered to a surface of oxide particles and the filter layer 54 providing at least one selective absorption peak for light at a predetermined wavelength of light by the induction of a surface plasma resonance (SPR) phenomenon at the interface between the metal particulates and the oxide particles; and a protective layer 110 disposed on the filter layer 54.

[0090] Also, a filter layer or filter layers, such as filter layer 54 of Fig. 16, between the second dielectric layer 80b and the protective layer 110 can include more than two kinds of metals and oxides with differing absorption peak wavelengths. Also, in this regard,

Fig. 17 is a cross-sectional view of another embodiment of a PDP B5 according to the present invention, similar in components composition and structure as described above with respect to PDP B2 of Figs. 13 and 14, except for the third dielectric layer 80c, and PDP B4 of Fig. 16. However, as illustrated in PDP B5 of Fig. 17, a plurality of filter layers 54a, 54b can be applied between the second dielectric layer 80b and the protective layer 110, providing absorption peaks for light respectively at different wavelengths of light.

13. Please amend paragraph [0110] as follows:

[0110] A CRT including the face panel of Example 1 had an absorption peak at 580 nm as shown in Fig. 18. Cathode ray tubes (CRTs) including the face panel of Examples 2 through 12 each had an absorption peak at 580 nm . CRTs including the face panel of Examples 13 had two main absorption peaks at 580 nm and 410 nm as shown in Fig. 19. Cathode ray tubes (CRTs) including the face panel of Examples 14 and 15 had two main absorption peaks at 580 nm and 410 nm. These absorption peaks illustrate the occurrence of surface plasma resonance at the interface of metal particulates and oxide particles[[],] in the filter layer or filter layers according to the present invention. ~~To the contrary In contrast,~~ a CRT including the face panel of Comparative Example 1 had no significant absorption peak.

14. Please amend paragraphs [0121]-[0122] as follows:

[0121] The filter layer or filter layers of the present invention absorb light in the overlapping wavelengths among RGB phosphors, and thus reduce reflection on the panel for a display. A sintering process advantageously is not required, since a reduced metal and a water-based oxide sol are used. Additional explosion proof equipment is also advantageously not required because the water-based sol is used instead of an alcohol-based sol. A filter layer of the present invention is formed by drying the coated panel at

room temperature through a sol-gel process. The absorption intensity and wavelength of a filter layer according to the present inventions can be adjusted by controlling the kind, or type, and contents of a metal and the size of a metal particulate, or the kind, or type, and contents of an oxide, more easily than in a conventional method where dyes or pigments are typically used.

[0122] While there have been illustrated and described what are considered to be preferred embodiments of the present invention, it will be understood by those skilled in the art that various changes and modifications may be made, and equivalents may be substituted for elements thereof, without departing from the true scope of the present invention. In addition, many modifications may be made to adapt a particular situation to the teaching of the present invention without departing from the scope thereof. Therefore, it is intended that the present invention not be limited to the particular embodiments disclosed as the best mode contemplated for carrying out the present invention, but that the present invention ~~includes~~ include all embodiments falling within the scope of the appended claims.